

Surfside Water System

2023 Annual Report

Introduction

This report provides a summary of the Surfside Park Estates Water Service for 2023 and includes a description of the service, summary of the water supply, demand and production, drinking water quality, operations highlights, capital project updates and financial report.

Service Description

The community of Surfside is a rural residential development located on Mayne Island in the Southern Gulf Islands Electoral Area which was originally serviced by a private water utility. In 2003 the service converted to the Capital Regional District (CRD). The Surfside Water Service (Figure 1) area is made up of 127 parcels of which 105 parcels can be inhabited encompassing a total area of approximately 25 hectares. Of the 105 parcels, 68 were connected to the water system in 2023.

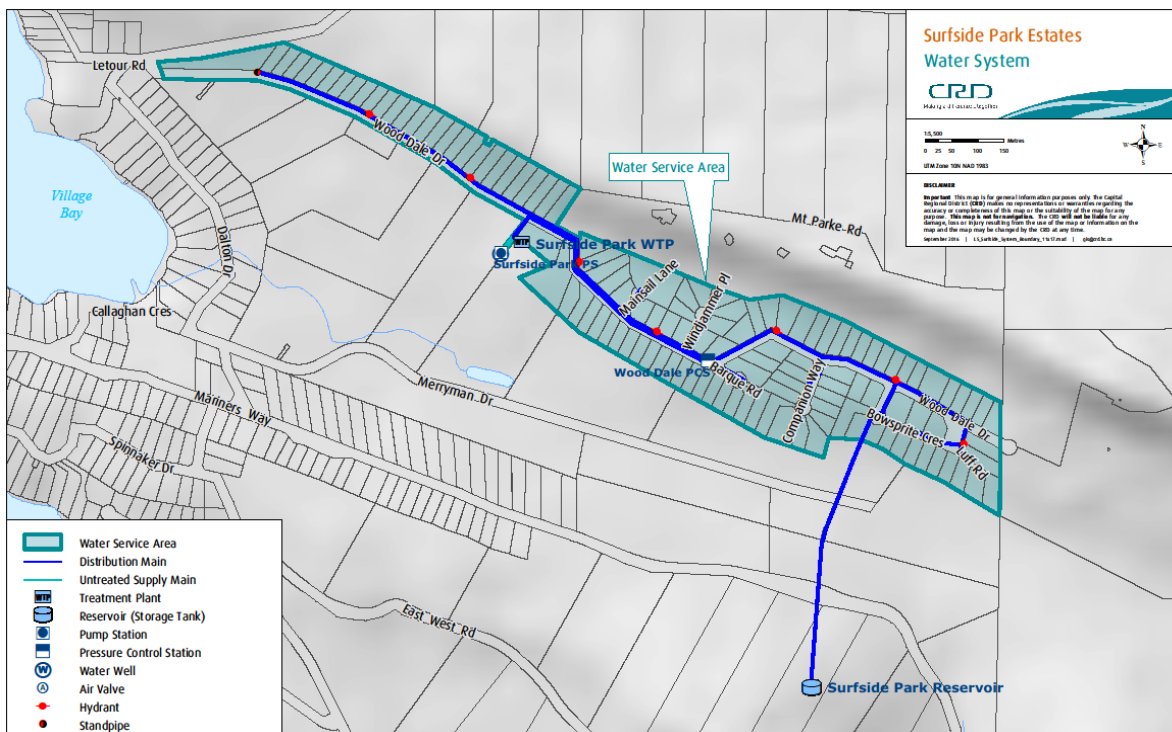


Figure 1: Surfside Park Estates Water Service

The Surfside water system is primarily comprised of:

- One groundwater well, related pumping and control equipment and building.
- Disinfection process equipment (filters, ultraviolet [UV] light and chlorine).
- Two steel storage tanks (total volume is 113 cubic meters).
- Distribution system (3,800 meters of water mains).
- Other water system assets: 68 service connections and water meters, five hydrants, three standpipes, 30 gate valves, one air release valve, Supervisory Control and Data Acquisition (SCADA) system and portable generator.

Water Supply

Groundwater supply monthly water levels are highlighted for 2023 in Figure 2. Groundwater levels for 2023 are 10% lower than the 5-year average. Aquifer levels are trending down likely the result of ongoing drought in which the Province declared level 5 drought conditions for the Southern Gulf Islands for a second consecutive year.

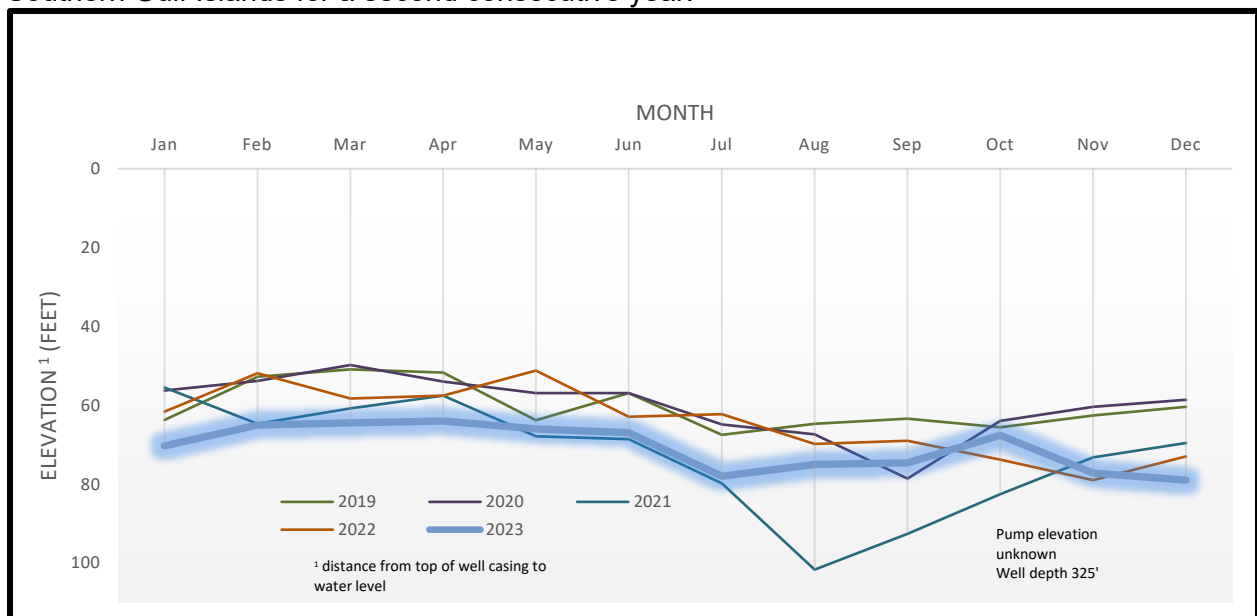


Figure 2: Surfside Park Estates Well #5A Groundwater Supply Monthly Water Level

Water Production and Demand

Referring to Figure 3, 13,730 cubic meters of water was extracted (water production) from the groundwater source (Well #5) in 2023; a 3% increase from the previous year and a 19% increase from the five-year average. Water demand (customer water billing) for the service totaled 4,539 cubic meters of water; a 19% decrease from the previous year and a 10% decrease from the five-year average.

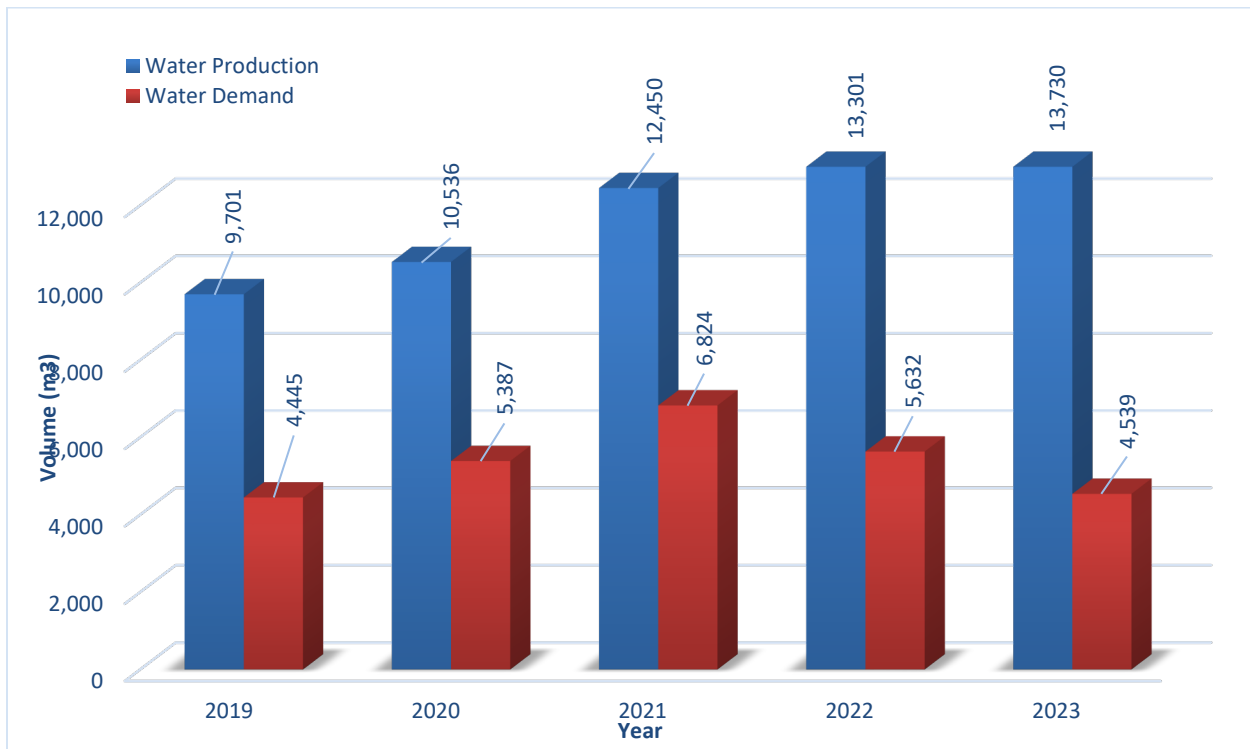


Figure 3: Surfside Park Estates Water Service Annual Water Production and Demand

The difference between annual water production and annual customer water demand is referred to as non-revenue water and can include water system leaks, water system maintenance and operational use (e.g. water main flushing, filter system backwashing), potential unauthorized use and fire-fighting use.

The 2023 non-revenue water (9,191 cubic meters) represents approximately 67% of the total water production for the service area. Approximately 264 cubic meters of water can be attributed to operational use so the remaining amount (65%) of non-revenue water is considered significant for a small water service. It is important to note that leak detection and repair efforts continue to be prioritized for the service. Water system leaks located and repaired in 2022 did not result in a reduction of non-revenue water from the previous year. A more robust and focused leak detection program will continue for the service.

Figure 4 below illustrates the monthly water production for 2023 along with the historical water production information for the previous four years. Typically, the monthly water production trend is greatest during the summer period (June to September). However, monthly water production for the most part is consistent throughout the year which indicates limited outdoor water use.

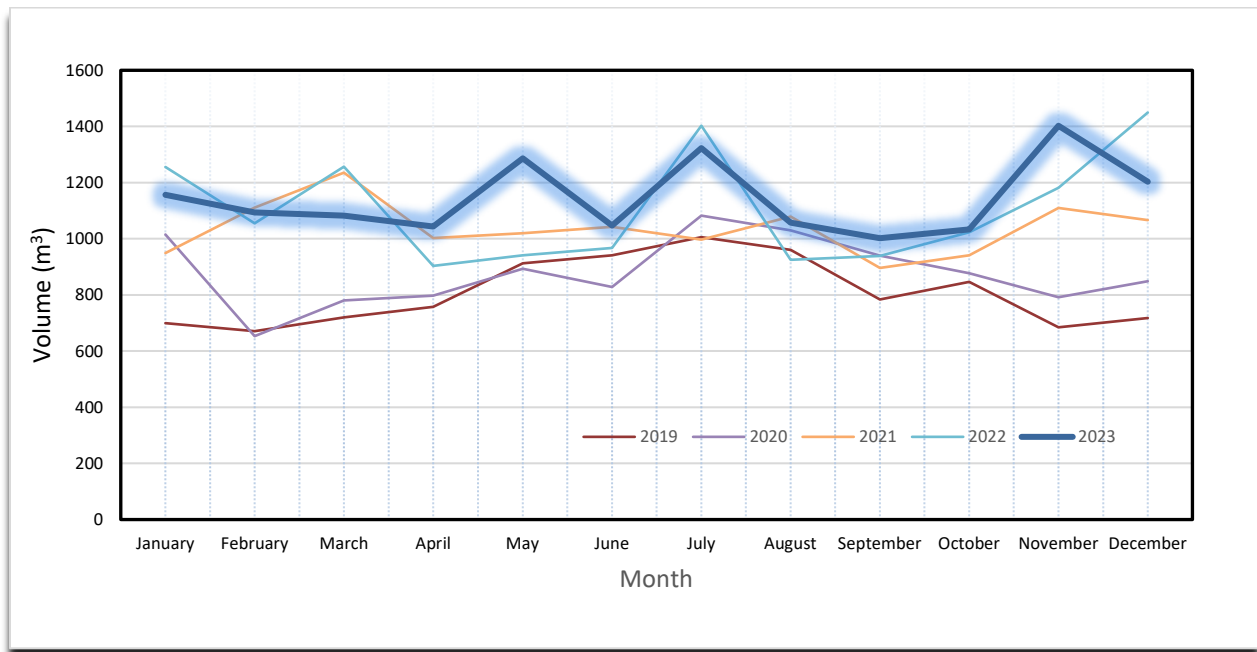


Figure 4: Surfside Park Estates Water Service Monthly Water Production

Drinking Water Quality

Staff completed the water quality monitoring program at Surfside based on the regulatory requirements and system specific risks. Samples were collected at regular frequencies from both the raw water as well as from several sampling stations at the treatment plant and in the distribution system. The samples were submitted for various analyses to the CRD’s Water Quality Lab or to external laboratories for special analyses such as disinfection by-products or metals.

The water system performed well in 2023 and supplied drinking water of good quality to its customers. None of the raw water samples tested positive for *E. coli* or total coliform bacteria in 2023. Also, all treated water samples tested negative for *E. coli* or total coliform bacteria in 2023. The raw water exhibited consistently high arsenic concentrations as well as elevated manganese concentrations. The system experienced one very brief event with slightly elevated arsenic concentrations leaving the treatment plant. Test results revealed that the drinking water that reached the customers was very likely still within the acceptable levels for arsenic concentrations throughout the duration of this event and therefore no health concerns were raised. Overall, the existing treatment successfully reduced arsenic and manganese concentrations to levels well below the health related and aesthetic limits in the Guidelines for Canadian Drinking Water Quality.

The data below provides a summary of the water quality characteristics in 2023:

Raw Water:

- Results from Well #5, the only water source, indicated that produced water contained no *E. coli* bacteria and no total coliform bacteria.
- The raw water continued to have naturally high concentrations of arsenic and manganese. The arsenic concentration in the raw water ranged from 53.4 to 72.3 µg/L. That is approximately 20% higher than in 2022. Manganese had a median concentration of 33.4 µg/L.
- The raw water turbidity was low with a median of 0.58 Nephelometric Turbidity Unit (NTU).
- The raw water was slightly hard (median hardness 28.8 mg/L (CaCO₃). Annual median pH was 7.6.

Treated Water:

- The treated water was safe to drink with no *E. coli* or total coliform bacteria in any sample.
- The treated water turbidity was very low with a median of 0.2 NTU.
- The arsenic concentration after treatment was generally below the maximum allowable concentration (MAC) of 10 µg/L. The annual median arsenic concentration was 3.78 µg/L. One treated water sample collected on July 6 at the treatment plant sampling location recorded an arsenic concentration of 10.1 µg/L. The lab result for this sample was received on July 11. The arsenic filter media in Filter Vessel A had expired much faster than expected. The same day, July 11, the operators took the treatment train A offline, and the system was supplied through Filter Vessel B only, which still had sufficient treatment capacity for the entire flow. While the treated water leaving the treatment plant likely had slightly elevated arsenic concentrations from July 6 to July 11, the arsenic concentrations deeper in the distribution system supplying the customers was very likely still below the MAC of 10 µg/L as evidenced by a distribution sample result from July 6 that recorded an arsenic concentration of 6.6 µg/L which had only risen to 7.8 µg/L by July 12. By July 12, with the expired Filter A offline, the treatment plant was supplying water with very low arsenic concentrations (1.3 µg/L) again which began diluting the elevated concentration further downstream in the system. Therefore, this event did not present an actual health risk to the Surfside customers. The operators have adopted since a more cautious approach when assessing the remaining filter media lifespan.
- Very low manganese concentrations in the treated water indicate the effectiveness of the filtration system in terms of arsenic and manganese removal.
- The annual average levels of the disinfection by-product total trihalomethanes (TTHM) were well below the MAC. Haloacetic acids (HAA) were not tested in 2023. Typically, when THM concentrations are low, HAA are also low.
- The free chlorine residual concentrations ranged from 0.22 to 1.34 mg/L in the distribution system indicating good secondary disinfection in most parts of the system except for some dead-end sections with higher water age.

Table 1 and 2 below provide a summary of the 2023 raw and treated water test results.

Water quality data collected from this drinking water system can be reviewed on the CRD website:

<https://www.crd.bc.ca/about/data/drinking-water-quality-reports>

Operational Highlights

The following is a summary of the major operational issues that were addressed by CRD Integrated Water Services staff:

- Water treatment plant:
 - Backwash tank maintenance including vac truck removal.
 - Drain and clean out WTP clear well.
 - Rebuild control valves.
- Leak detection near Wood Dale Drive and Bowsprite Crescent.
- Remove hose bibs from sample points to improve sample collection.
- Cap service along Wood Dale Drive.
- New ballast installed in UV unit.

Capital Projects Update

The Capital Projects that were in progress or completed in 2023 include:

- System Review Project – A system review and tank replacement options assessment was completed in 2023. This engineering study assessed several options and resulted in the recommendation to further pursue the feasibility of replacing the existing water tanks in a new location within Mount Parke Regional Park, which would allow for a more accessible, gravity fed system.

Financial Report

Please refer to the attached 2023 Statement of Operations and Reserve Balances.

Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), and interest on savings (Interest earnings), a transfer from the Operating Reserve Fund, and miscellaneous revenue such as late payment charges (Other revenue).

Expenses include all costs of providing the service. General Government Services include budget preparation, financial management, utility billing and risk management services. CRD Labour and Operating Costs include CRD staff time as well as the costs of equipment, tools, and vehicles. Debt servicing costs are interest and principal payments on long term debt. Other Expenses include all other costs to administer and operate the water system, including insurance, supplies, water testing and electricity.

The difference between Revenue and Expenses is reported as Net revenue (expenses). Any transfers to or from capital or reserve funds for the service (Transfers to Own Funds) are deducted from this amount and added to any surplus or deficit carry forward from the prior year, yielding an Accumulated Surplus (or deficit) that is carried forward to the following year.

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Attachments: Table 1
Table 2
2023 Statement of Operations and Reserve Balances

For questions related to this Annual Report please email IWSAdministration@crd.bc.ca

Table 1

Table 1: 2023 Summary of Raw Water Test Results, Surfside Water System										
PARAMETER		2023 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2013-2022 ANALYTICAL RESULTS			
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum Maximum		≤ = Less than or equal to	Median	Samples Analyzed	Range Minimum Maximum	
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness as CaCO ₃	mg/L	28.8	13	4.28	45.9	No Guideline Required	41.9	37	18.2	60.3
Turbidity	NTU	0.575	12	0.25	1.3		0.4	46	0.12	1.34
Water Temperature	deg C	11.15	22	6.8	12.3	15°C AO	6.8	191	5.2	21.6
pH	pH units	7.6	3	7.6	8.8	AO pH 7.0 -10.5	8.73	23.0	7	9
Total Organic Carbon	mg/L	0.535	4	0.48	0.69		0.78	25	0.44	4.89
Metals										
Aluminum	ug/L as Al	11.6	13	7.8	24.2	2900 MAC / 100 OG	14.7	37	7.2	65
Antimony	ug/L as Sb	< 1	13	< 0.5	< 1	6 MAC	< 0.5	37	< 0.5	< 2.5
Arsenic	ug/L as As	59.5	13	53.4	72.3	10 MAC	42.2	1	42.2	42.2
Barium	ug/L as Ba	47.1	13	15.5	66.4	1000 MAC	60	37	32.9	75.5
Beryllium	ug/L as Be	< 0.2	13	< 0.1	< 0.2		< 0.1	37	< 0.1	< 3
Bismuth	ug/L as Bi	< 2	13	< 1	< 2		< 1	37	< 1	< 5
Boron	ug/L as B	1960	13	1670	2800	5000 MAC	1720	37	1.25	2110
Cadmium	ug/L as Cd	< 0.02	13	< 0.01	< 0.02	7 MAC	< 0.01	37	< 0.01	0.135
Calcium	mg/L as Ca	9.39	13	1.54	14.9	No Guideline Required	13.5	37	5.91	19.6
Chromium	ug/L as Cr	< 2	13	< 1	21.4	50 MAC	< 1	37	< 1	< 10
Cobalt	ug/L as Co	< 0.4	13	< 0.2	< 0.4		< 0.2	37	< 0.2	30
Copper	ug/L as Cu	1.29	13	< 0.2	21.7	2000 MAC / ≤ 1000 AO	0.57	37	< 0.2	52
Iron	ug/L as Fe	21.4	13	13	155	≤ 300 AO	25.2	36	< 10	61.3
Lead	ug/L as Pb	< 0.4	13	< 0.2	1.39	5 MAC	< 0.2	37	< 0.2	3.51
Lithium	ug/L as Li	68	13	56.6	83.8		61.9	16	50.4	70.5
Magnesium	mg/L as Mg	1.29	13	0.1	2.09	No Guideline Required	1.95	37	0.831	3.07
Manganese	ug/L as Mn	33.4	13	5.4	57.6	120 MAC / ≤ 20 AO	40.9	37	< 4	76.4
Molybdenum	ug/L as Mo	< 2	13	< 1	23		< 1	37	< 1	< 20
Nickel	ug/L as Ni	< 2	13	< 1	93		< 1	37	< 1	< 50
Potassium	mg/L as K	1.66	13	1.18	1.88		1.88	37	1.58	2.56
Selenium	ug/L as Se	< 0.2	13	< 0.1	0.97	50 MAC	< 0.1	37	< 0.1	1.24
Silicon	ug/L as Si	6890	13	5940	8100		7250	37	912	12800
Silver	ug/L as Ag	< 0.04	13	< 0.02	< 0.04	No Guideline Required	< 0.02	37	< 0.02	< 10
Sodium	mg/L as Na	139	13	121	182	≤ 200 AO	123	37	13.1	152
Strontium	ug/L as Sr	215	13	41	327	7000 MAC	277	37	0.312	410
Sulfur	mg/L as S	19.8	13	16.1	28.7		16.8	32	11.7	22
Thallium	ug/L as Tl	< 0.02	13	< 0.01	< 0.02		< 0.01	32	< 0.01	< 0.05
Tin	ug/L as Sn	< 10	13	< 5	< 10		< 5	37	< 5	< 25
Titanium	ug/L as Ti	< 10	13	< 5	< 10		< 5	37	< 5	< 25
Uranium	ug/L as U	< 0.2	13	< 0.1	< 0.2	20 MAC	< 0.1	32	< 0.1	< 0.5
Vanadium	ug/L as V	< 10	13	< 5	< 10		< 5	37	< 5	< 25
Zinc	ug/L as Zn	< 10	13	< 5	< 10	≤ 5000 AO	< 5	37	< 1	185
Zirconium	ug/L as Zr	< 0.2	13	< 0.1	< 0.2		< 0.1	32	< 0.1	< 0.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	< 1	12	< 1	< 1		< 1	120	< 1	28
<i>E. coli</i>	CFU/100 mL	< 1	12	< 1	< 1		< 1	120	< 1	< 10
Heterotrophic bacteria, 7 day	CFU/mL	Not analyzed in 2023								
Parasites										
<i>Cryptosporidium</i> , Total oocysts	oocysts/100 L	Last tested in 2015				Zero detection desirable	0.185	4	< 1	0.185
<i>Giardia</i> , Total cysts	cysts/100 L	Last tested in 2015				Zero detection desirable	< 1	4	< 1	< 1

Table 2

Table 2: 2023 Summary of Treated Water Test Results, Surfside Water System										
PARAMETER		2023 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2013-2022 ANALYTICAL RESULTS			
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum Maximum		≤ = Less than or equal to	Median	Samples Analyzed	Range Minimum Maximum	
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness	mg/L as CaCO3	32.6	26	19.3	42.2		35.3	52	20.3	55.9
pH	pH units	7.6	3	7.6	8.9	AO pH 7.0 -10.5	8.5	23	7	8.7
Turbidity	NTU	0.2	12	0.1	0.35		0.15	106	0.09	1.8
Total Organic Carbon	mg/L	0.48	8	0.41	0.72		<0.5	51	< 0.2	1.51
Water Temperature	deg C	11.7	171	3.6	21.1	15°C AO	7.8	1774	0.32	24.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	< 1	61	< 1	< 1	0 MAC	< 1	419	<1	40
<i>E. coli</i>	CFU/100 mL	< 1	61	< 1	< 1	0 MAC	< 1	419	<1	< 1
Hetero. Plate Count, 7 day	CFU/1 mL		Not tested in 2023			No Guideline Required	< 10	44	<1	940
Disinfectants										
Disinfectants										
Chlorine, Free Residual	mg/L as Cl2	0.65	171	0.22	1.34		0.56	1785	0.04	2.06
Chlorine, Total Residual	mg/L as Cl2	0.74	15	0.35	1.38		0.61	1306	0.12	1.87
Disinfection By-Products										
Disinfection Byproducts										
Bromodichloromethane	ug/L	3.8	7	1.4	5.5		4.29	54	1.1	18
Bromoform	ug/L	7.8	7	2.3	15		5.05	54	< 0.1	12
Chloroform	ug/L	1.3	7	< 1	2.1		1.89	54	0.154	10
Chlorodibromomethane	ug/L	9.6	7	2.3	11		7.73	54	1.5	14.1
Total Trihalomethanes	ug/L	25	7	7.2	32	100 MAC	19	53	5.7	50
Haloacetic Acids (HAAs)										
HAA5	ug/L		Not tested in 2023			80 MAC	< 5	4	< 5	< 5
Metals										
Aluminum	ug/L as Al	< 6	26	< 3	10.1	2900 MAC / 100 OG	4.8	51	< 3	59
Antimony	ug/L as Sb	< 0.5	26	< 0.5	< 1	6 MAC	< 0.5	51	< 0.05	< 2.5
Arsenic	ug/L as As	3.775	26	1.19	10.1	10 MAC	4.66	156	< 0.03	31
Barium	ug/L as Ba	41.2	26	18.2	57.6	1000 MAC	46.2	51	3.2	69.9
Beryllium	ug/L as Be	< 0.1	26	< 0.1	< 0.2		< 0.1	51	< 0.1	< 3
Bismuth	ug/L as Bi	< 1	26	< 1	< 2		< 1	49	< 1	< 5
Boron	ug/L as B	1930	26	1620	2170	5000 MAC	1750	51	1200	2240
Cadmium	ug/L as Cd	< 0.01	26	< 0.01	0.025	7 MAC	< 0.01	51	< 0.01	< 0.1
Calcium	mg/L as Ca	9.945	26	5.91	13.3	No Guideline Required	10.8	52	6.22	18
Chromium	ug/L as Cr	< 1	26	< 1	< 2	50 MAC	< 1	51	< 1	< 10
Cobalt	ug/L as Co	< 0.2	26	< 0.2	< 0.4		< 0.2	51	< 0.2	24
Copper	ug/L as Cu	2.955	26	1.62	19	2000 MAC / ≤ 1000 AO	3.38	51	0.91	21.8
Iron	ug/L as Fe	9.65	26	< 5	104	≤ 300 AO	5.7	51	< 5	63.1
Lead	ug/L as Pb	0.425	26	< 0.2	1.55	5 MAC	0.3	51	< 0.2	1.09
Lithium	ug/L as Li	62.85	26	56.2	69.9		60.4	27	54.3	71.1
Magnesium	mg/L as Mg	1.765	26	1.09	2.16	No Guideline Required	1.99	52	1.04	3.05
Manganese	ug/L as Mn	< 1	26	< 1	< 2	120 MAC / ≤ 20 AO	< 1	51	< 1	31
Molybdenum	ug/L as Mo	< 1	26	< 1	< 2		< 1	51	< 1	< 20
Nickel	ug/L as Ni	< 1	26	< 1	< 2		< 1	51	< 1	< 50
Potassium	mg/L as K	1.745	26	1.51	1.91		1.8	52	1.47	2.35
Selenium	ug/L as Se	< 0.1	26	< 0.1	< 0.2	50 MAC	< 0.1	51	< 0.1	< 0.5
Silicon	ug/L as Si	7280	26	4490	7990		7090	51	2350	8950
Silver	ug/L as Ag	< 0.02	26	< 0.02	< 0.04	No Guideline Required	< 0.02	51	< 0.02	< 10
Sodium	mg/L as Na	130.5	26	119	147	≤ 200 AO	125	52	102	142
Strontium	ug/L as Sr	265	26	171	330	7000 MAC	293	51	171	399
Sulphur	mg/L as S	17.35	26	15.3	20.5		17.9	50	13.8	22.4
Thallium	ug/L as Tl	< 0.01	26	< 0.01	< 0.02		< 0.01	49	< 0.01	< 0.05
Tin	ug/L as Sn	< 5	26	< 5	< 10		< 5	51	< 5	< 25
Titanium	ug/L as Ti	< 5	26	< 5	< 10		< 5	51	< 5	< 25
Uranium	ug/L as U	< 0.1	26	< 0.1	< 0.2	20 MAC	< 0.1	49	< 0.1	< 0.5
Vanadium	ug/L as V	< 5	26	< 5	< 10		< 5	51	< 5	< 25
Zinc	ug/L as Zn	< 10	26	< 5	32	≤ 5000 AO	5.8	51	< 5	167
Zirconium	ug/L	< 0.1	26	< 0.1	< 0.2		< 0.1	49	< 0.1	< 0.5